

AIR FORCE QUALIFICATION TRAINING PACKAGE (AFQTP)



for
PAVEMENTS AND CONSTRUCTION EQUIPMENT OPERATOR
(3E2X1)

MODULE 21

EXCAVATING/TRENCHING MACHINES

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Career Field Education and Training Plan (CFETP) references from 1 Apr 97 version.

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AIR FORCE QUALIFICATION TRAINING PACKAGES
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INTRODUCTION

Before starting this AFQTP, refer to and read the “Trainee/Trainer Guide” located on the AFCEA Web site <http://www.afcesa.af.mil/>

AFQTPs are mandatory and must be completed to fulfill task knowledge requirements on core and diamond tasks for upgrade training. *It is important for the trainer and trainee to understand* that an AFQTP **does not** replace hands-on training, nor will completion of an AFQTP meet the requirement for core task certification. AFQTPs will be used in conjunction with applicable technical references and hands-on training.

AFQTPs and Certification and Testing (CerTest) must be used as minimum upgrade requirements for Diamond tasks.

MANDATORY minimum upgrade requirements:

Core task:

AFQTP completion
Hands-on certification

Diamond task:

AFQTP completion
CerTest completion (80% minimum to pass)

Note: *Trainees will receive hands-on certification training for Diamond Tasks when equipment becomes available either at home station or at a TDY location.*

Put this package to use. Subject matter experts under the direction and guidance of HQ AFCEA/CEOT revised this AFQTP. If you have any recommendations for improving this document, please contact the Career Field Manager at the address below.

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Notice. This AFQTP is **NOT** intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.



BACKHOE

MODULE 21

AFQTP UNIT 1

PERFORM OPERATIONAL CHECKS (21.1.1.)

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

PERFORM OPERATIONAL CHECKS

Task Training Guide

STS Reference Number/Title:	21.1.1. Perform Operational Checks
Training References:	<ul style="list-style-type: none">• Owner's Manual• Local procedures
Prerequisites:	<ul style="list-style-type: none">• Possess as a minimum a 3E231 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none">• Backhoe• Personal Protective Equipment
Learning Objective:	<ul style="list-style-type: none">• The trainee will be able to properly conduct operational checks on a backhoe
Samples of Behavior:	<ul style="list-style-type: none">• The trainee will demonstrate the ability to perform operational checks on a backhoe
Notes:	
<ul style="list-style-type: none">• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves, hearing protection, and safety goggles)	
<ul style="list-style-type: none">• Any safety violation is an automatic failure	

Notice. This AFQTP is NOT intended to replace the applicable technical references nor is it intended to replace hands-on training if equipment is available. It is to be used in conjunction with these for training purposes only.

PERFORM OPERATIONAL CHECKS

Background: There are several types of backhoes in the Air Force. Specific pre-operational inspection procedures will be found in the owner's manual that accompanied the equipment. It is important to properly check and service the equipment prior to operation.

To perform the tasks, follow these steps:

Step 1: Utilizing AF Form 1806.

The AF Form 1806 is the appropriate form used to check out all Air Force vehicles. It lists all common inspection items and provides space to add unique inspection items required of unique vehicles. When checking out a backhoe, check all the items listed that pertain.

Step 2: Vehicle Exterior.

Inspection of the vehicle exterior begins with a 360-degree walk around. Walking around the vehicle first thing is an excellent opportunity to identify anything out of the ordinary that could have happened since the backhoe was last used. Things like flat tires or broken parts will stand out. Also look for any exterior damage and/or leaks from underneath. In addition, be sure to check the bucket assemblies for wear.

HINT:

Puddles of fluid and dirty areas on the engine or ground normally indicate problem areas and should be investigated and repaired as soon as possible.

Step 3: Drive Engine Compartment.

Check the engine oil, coolant, transmission fluid levels, and fill as needed. Inspect the drive belts for tension and alignment. Ensure the battery connections are secure and free from corrosion.

Review Questions
for
Perform Operational Checks

Question	Answer
1. What is the AF Form 1806 used for?	a. Inspect AF vehicles b. It is not used by the Air Force c. It is used to authorize digging d. Report damage to a facility
2. What are you looking for when conducting a 360-degree walk around?	a. Leaks or puddles under the equipment b. Loose lug nuts or flat tires c. Look for broken parts d. All of the above
3. All of the following items will be checked in the engine compartment, except what?	a. Drive belts b. Engine oil c. Transaxle d. Coolant

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PERFORM OPERATIONAL CHECKS

Performance Checklist		
Step	Yes	No
1. Utilized AF Form 1806 properly?		
2. Inspected vehicle exterior correctly?		
3. Correctly inspected proper components of the drive engine compartment?		

FEEDBACK: Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



BACKHOE

MODULE 21

AFQTP UNIT 1

LOAD MATERIALS: WITH BACKHOE BUCKET (21.1.2.1.2.)

EXCAVATE (21.1.2.2.)

LOAD MATERIALS: WITH BACKHOE BUCKET

EXCAVATE

Task Training Guide

STS Reference Number/Title:	21.1.2.1.2. With Backhoe Bucket 21.1.2.2. Excavate
Training References:	<ul style="list-style-type: none">• Specific Operator's Manual• Local Operating Procedures
Prerequisites:	<ul style="list-style-type: none">• Possess as a minimum a 3E231 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none">• Backhoe• Personal Safety Equipment
Learning Objective:	<ul style="list-style-type: none">• Trainee will be able to properly excavate and load material with the rear bucket of a backhoe.
Samples of Behavior:	<ul style="list-style-type: none">• The trainee will demonstrate the proper procedures in excavating and loading materials with the rear bucket of a backhoe.
Notes:	
<ul style="list-style-type: none">• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves, hearing protection, and safety goggles)	
<ul style="list-style-type: none">• Any safety violation is an automatic failure	

LOAD MATERIALS: WITH BACKHOE BUCKET

EXCAVATE

Background: Before beginning any digging operation, you must have an AF Form 103, Base Civil Engineering Work Clearance Request (digging permit), in your possession. With the AF Form 103 in hand, check the area in and around the excavation site. Look for any hazards and utilities marked on the Form and for any additional obstructions or hazards in the area (culverts, cable markers, grade stakes, or underground utilities). Finally, look for marked construction stakes that may provide additional information concerning the proposed trench. Once you have checked the area, align your backhoe with the proposed trench.

To perform the task of excavating, follow these steps:

Step 1: Stabilize the front of the backhoe.

With the backhoe in line with the proposed trench, lower the front bucket on the ground just enough to take the pressure off the front tires. See owner's manual for the proper position of the front bucket

Step 2: Rotate the seat 180°.

Rotate the seat so you are facing to the rear of the machine and the controls are in front of you

Step 3: Stabilize the rear of the backhoe.

Lower the rear stabilizers with only enough down pressure to slightly lift the rear tires off the ground

Step 4: Level the backhoe.

Ensure the backhoe is level by raising or lowering the outriggers as necessary. If the outriggers aren't long enough to level the machine, it may be necessary to place dunnage under the pad to assist in leveling

Step 5: Set the hand throttle to recommended rpm.

Depending on the digging conditions and obstructions in the area, the throttle may be increased or decreased as necessary. The more throttle, the decrease in "feeling" any hit obstructions

Step 6: Position boom for digging.

Unlock the boom and fully extend the dipper while keeping the bucket close to the ground

Step 7: Make a marking pass to outline the trench.

Curl the bucket three to five inches before placing on the ground. Bring the dipper in and raise the boom simultaneously to cut an even trench. Your first cut is to dig just deep enough to outline the trench. When the dipper has been pulled back and is at a 90° angle with the ground, your marking pass is complete

Step 8: Curl bucket at end of pass. .

When the dipper reaches the end of the pass, curl the bucket, lift the dipper and boom, and swing the bucket to the outside of the trench. Evenly place the spoil on the side by uncurling the bucket

Step 9: Continue digging.

Make continuous cuts until the desired depth is achieved. Use the same procedures as the marking pass, except deeper allowing the bucket to dig into the ground without exceeding the digging capability of the backhoe.

Step 10: Level the bottom of the trench.

Once you reach the desired depth, level the bottom of the trench. This can be accomplished by scraping the bottom using the same technique used for the marking pass.

To perform the task of loading with backhoe bucket, follow these steps:

Step 1: Obtain a full bucket.

Follow above steps for excavating to obtain a full bucket of material.

Step 2: Load dump truck.

The truck should be positioned next to the trench but far enough away where there is no chance of the trench caving. You can load over the side or rear of the truck with best results achieved when loading directly over the rear of the bed. Ensuring the bucket is kept curled, swing/raise the boom and extend the dipper stick to position the bucket over the bed. Once in position, uncurl the bucket slowly to remove the material. Swing the boom back over the trench and continue until the job is complete. These functions are done simultaneously and take considerable time to achieve.

SAFETY:

NEVER LOAD OVER THE CAB OF THE TRUCK. ANY PERSONNEL IN THE IMMEDIATE AREA MUST BE MADE TO WEAR HARD HATS

**Review Questions
for
Load Materials: With Backhoe Bucket
Excavate**

Question	Answer
1. When should you obtain a digging permit?	a. When you suspect utilities in the area b. When stated on the work order c. During real digging not training d. Before starting any dig
2. How high should the rear wheels be off the ground?	a. Just high enough to clear the ground b. Above the outrigger pads c. 12 to 18 inches d. Until they spin
3. For best results, always load the dump truck over the cab.	a. True b. False

WITH BACKHOE BUCKET, LOAD MATERIALS

EXCAVATE

Performance Checklist		
Steps for excavating	Yes	No
1. Stabilized the front of the backhoe?		
2. Rotated the seat 180°?		
3. Stabilized the rear of the backhoe?		
4. Leveled backhoe?		
5. Set the hand throttle to desired engine rpm		
6. Positioned boom for digging?		
7. Made marking pass to outline the trench?		
8. Curled bucket at end of pass?		
9. Made continuous trenching passes?		
10. Continued digging at a uniform depth?		
11. Leveled bottom of trench?		
Steps for loading materials with backhoe bucket	Yes	No
1. Obtained a full bucket?		
2. Loaded dump truck?		

FEEDBACK: Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



BACKHOE

MODULE 21

AFQTP UNIT 1

BACKFILL (21.1.2.3.)

BACKFILL

Task Training Guide

STS Reference Number:	21.1.2.3. Backfill
Training References:	<ul style="list-style-type: none">• Specific Operator's Manual• Local Operating Procedures
Prerequisites:	<ul style="list-style-type: none">• Possess as a minimum a 3E231 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none">• Backhoe• Personal Safety Equipment
Learning Objective:	<ul style="list-style-type: none">• The trainee will be able to properly backfill using a backhoe.
Samples of Behavior:	<ul style="list-style-type: none">• The trainee will demonstrate the ability to backfill using a backhoe.
Notes:	
<ul style="list-style-type: none">• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves, hearing protection, and safety goggles)	
<ul style="list-style-type: none">• Any safety violation is an automatic failure	

BACKFILL

Background: The backhoe is a good piece of equipment for backfilling ditches and trenches. An advantageous feature is the rubber tires that have a minimum tearing effect when working on a hard surface such as asphalt. By lowering the bucket to grade level, the forward movement of the machine will push the stockpiled earth into the trench.

To perform this task, follow these steps:

Step 1: Approach the spoil material area.

Level the bucket on the ground and proceed forward in low gear, perpendicular to the trench, until you penetrate the material. Limit the amount of material to half a bucket. Raise the engine speed just high enough to push the material ahead without spinning the tires. Push the material into the center of the trench, stop, and uncurl the bucket. Continue backfilling the trench while compacting the material in layers as required.

Step 2: Clean up the area.

Once the trench is compacted, re-straddle and back-drag to smooth any ridges. As the machine nears the end of the trench, gradually feather the material. Back-drag the rest of the area with the front bucket in the float position to flatten any windrows.

Review Questions
for
Backfill

Question	Answer
1. From what direction do you approach a trench for backfilling purposes?	a. Against the offset path of the loader b. Perpendicular to the trench c. Cross grain to the path of the loader d. Parallel to the trench
2. The proper way to compact a trench being backfilled is to drive over the trench with the back tires.	a. True b. False

BACKFILL

Performance Checklist		
Step	Yes	No
1. Approached the stockpile and backfilled?		
2. Cleaned up the area?		

FEEDBACK: Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.



BACKHOE

MODULE 21

AFQTP UNIT 1

PERFORM OPERATOR MAINTENANCE (21.1.3.)

PERFORM OPERATOR MAINTENANCE

Task Training Guide

STS Reference Number/Title:	21.1.3. Perform Operator Maintenance
Training References:	<ul style="list-style-type: none">• Local Technical Orders• Local Procedures
Prerequisites:	<ul style="list-style-type: none">• Possess as a minimum a 3E231 AFSC
Equipment/Tools Required:	<ul style="list-style-type: none">• Backhoe• Personal Protective Equipment
Learning Objective:	<ul style="list-style-type: none">• The trainee will be able to perform operational checks on a backhoe
Samples of Behavior:	<ul style="list-style-type: none">• The trainee will demonstrate the proper procedures for operational checks
Notes:	
<ul style="list-style-type: none">• Personnel are required to wear all personal protective equipment pertaining to each task (i.e. work gloves, hearing protection, and safety goggles)	
<ul style="list-style-type: none">• Any safety violation is an automatic failure.	

PERFORM OPERATOR MAINTENANCE

Background: Backhoe maintenance, like any other maintenance, is very important. If the machine is not running well, then how is the job going to get done? The more effective maintenance program we have for the equipment, the better our operation will run. Correct and timely operator maintenance ensures that the equipment will do the job when needed and it will last longer. This saves the Air Force money. A good, money saving, operator maintenance program includes inspections to detect and correct minor deficiencies before they develop into major defects that could result in costly repairs. It also includes cleaning and servicing.

To perform the tasks, follow these steps:

Step 1: Cleaning

Clean the backhoe with a water truck or at the wash rack (NOTE: Remove large debris before cleaning to prevent clogging the wash rack drainage system). If you have trash or dirt all over your backhoe, it will be difficult to find lubrication points from the lube charts. It will also be hard to inspect the backhoe for damage or loose bolts.

Step 2: Lubrication.

Lubricate the machine according to the manufacture's vehicle manuals. Operating the machine in severe conditions requires frequent lubrication. It is very important to remove the dirt from the grease fittings before lubricating to prevent dirt from being forced into the internal parts.

Step 3: Refueling.

Refueling the backhoe is easy when driven to the service station. Simply drive to the service station and fill the fuel tank. If your equipment can't be driven to the service station, you must arrange for the fuel truck to come to the job site. You should fuel your backhoe at the end of *each working day* to prevent moisture from condensing and forming droplets within the fuel tank.

Step 4: Post operation Inspection.

As stated in operational checks, inspection is the best way to ensure that you give the proper care to your equipment. Air intake breathers are of special importance. There are generally two elements: (1) the primary (outer) element and, (2) the secondary (inner) element. Under dusty operating conditions, clean both elements daily (even more often if working conditions are extremely dusty).

Step 5: Check cutting edges.

Ensure the cutting edges are in good condition. Specifically, ensure they are not loose or worn excessively.

Review Questions
for
Perform Operator Maintenance

Question	Answer
1. Why is cleaning the backhoe a part of vehicle maintenance?	a. To find lubrication points and keep dirt out of the fittings. b. It makes it easy to inspect the backhoe for damage or loose bolts c. Assist in lubrication. d. All the above.
2. Lubrication is done by vehicle maintenance and should not be attempted by an operator.	a. True b. False
3. What are you looking for when inspecting the cutting edge?	a. For debris stuck in the cracks b. For excessive wear c. For reversibility d. You shouldn't

PERFORM OPERATOR MAINTENANCE

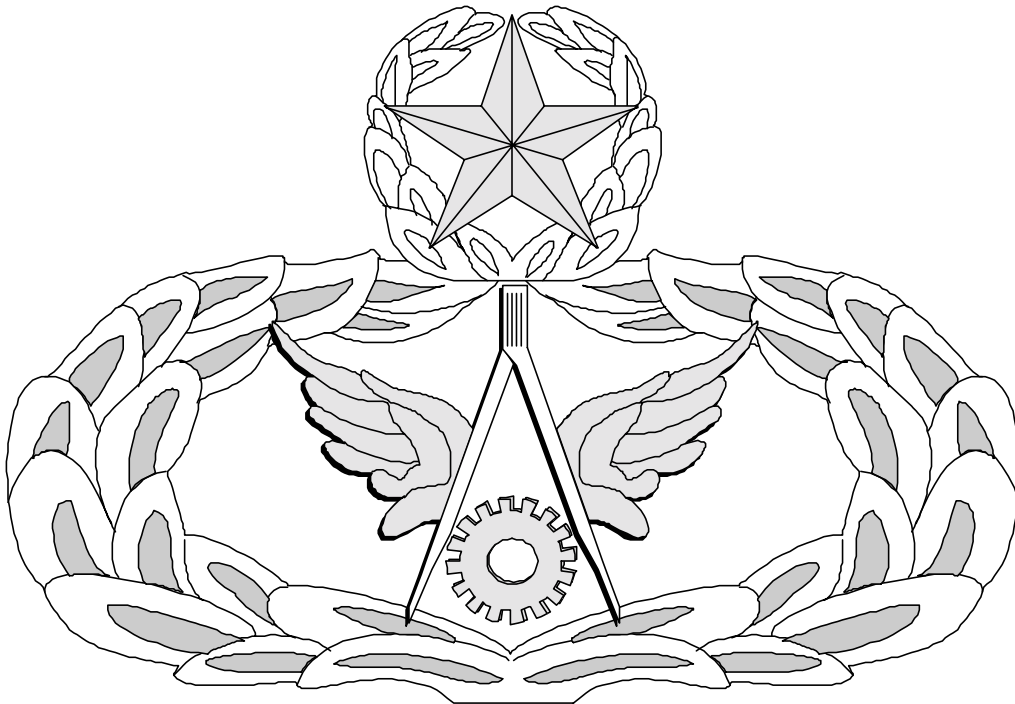
Performance Checklist		
Step	Yes	No
1. Cleaned appropriate parts?		
2. Lubricated required areas?		
3. Refueled equipment?		
4. Conducted post operations inspection?		
5. Inspected and changed cutting edges?		

FEEDBACK: Trainer should provide positive and/or negative feedback to the trainee immediately after the task is performed. This will ensure the issue is still fresh in the mind of both the trainee and trainer.

Air Force Civil Engineer

QUALIFICATION TRAINING PACKAGE (QTP)

REVIEW ANSWER KEY



FOR

PAVEMENTS & CONSTRUCTION EQUIPMENT OPERATOR

(3E2X1)

MODULE 21

EXCAVATING/TRENCHING MACHINES

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PERFORM OPERATIONAL CHECKS**(3E2X1-21.1.1.)**

Question	Answer
1. What is the AF Form 1806 used for?	a. Inspect AF vehicles
2. What are you looking for when conducting a 360-degree walk around?	d. All of the above
3. All of the following items will be checked in the engine compartment, except what?	c. Transaxle

LOAD MATERIALS: WITH BACKHOE BUCKET**EXCAVATE****(3E2X1-21.1.2.1.2. &21.1.2.2.)**

Question	Answer
1. When should you obtain a digging permit?	d. Before starting any dig
2. How high should the rear wheels be off the ground?	a. Just high enough to clear the ground
3. For best results, always load the dump truck over the cab.	b. False

BACKFILL**(3E2X1-21.1.2.3.)**

Question	Answer
1. From what direction do you approach a trench for backfilling purposes?	b. Perpendicular to the trench
2. Drive over the trench with the back tires for proper compaction.	b. False

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PERFORM OPERATOR MAINTENANCE

(3E2X1-21.1.3.)

Question	Answer
1. Why is cleaning the backhoe a part of vehicle maintenance?	d. All of the above
2. Lubrication is done by vehicle maintenance and should not be attempted by an operator.	b. False
3. What are you looking for when inspecting the cutting edge?	b. For excessive wear